

Chiropractic and multidisciplinary management of a traumatic injury in a 38 year old female: A case report

César Real-Jiménez, Ruth Postlethwaite, and Clare McIvor

Abstract: A 38y female presented for chiropractic care following traumatic injury in which she was hit by a bus while on her bicycle, yielding multiple severe injuries requiring surgical repair.

A multidisciplinary course of care was necessary to address the severe pain, impairment, and limitations to movement in the post-surgical stages.

This case report details complex injury, with gait abnormalities and pelvic instability, and the risk of losing a limb.

A significant outcome is the regaining of a QoL that enabled the patient to participate fully in exercise, recreation, and other activities she deemed meaningful.

Indexing Terms: Chiropractic; concomitant care; multidisciplinary care; Quality of Life; trauma.

Introduction

When a patient presents for Chiropractic care following a complex or traumatic injury it may be incumbent on Chiropractors to engage with multidisciplinary teams to ensure best-practice care and optimal outcomes. The ability to use objective tests to communicate with other health practitioners, and the importance of modifying techniques to suit the comfort, strength, and recovery level of the patient is critical to establish and maintain a positive therapeutic alliance. This is as true for patients and Chiropractors as it is for a Chiropractor and multidisciplinary teams.

Severe and traumatic injuries have the potential to significantly interrupt a patient's life or alter their expectations of it, decreasing their ability to undertake the activities of daily living (ADL) and bringing pain, disability, and new restrictions into their world. How Chiropractors and teams engage with the patient at this time, and offer comprehensive, holistic care may therefore vastly impact a

... Following a traumatic MVA this patient had a long road to recovery. Her care within a multi-disciplinary team is described and the patient has made a strong recovery'



person's life.

This case report details the multidisciplinary care of a 38y female who suffered a significant traumatic injury during which severe fractures were sustained and surgical management with bone loss was required. The patient was at risk of losing a limb, and her management and recovery had potentially significant impacts on her Quality of Life (QoL) going forward.

Case details

A 38y female presented for Chiropractic care following a traumatic injury during which she had been run over by a Metrobus while on her bicycle. An engineer by trade, she was under regular Chiropractic care prior to the accident and was used to having a moderate activity level.

At the time of the accident the patient suffered multiple open fractures of the left tibia and fibula, and bone loss in the diaphysis and distal portion of the fibula of approximately 2.3 centimetres. This led to five reconstructive surgeries after which she attended a Chiropractic clinic. In the rehabilitation and gait recovery period she was still presenting differences in consolidation and retention of the autograft from the extraction of the left pelvic bone.

During the immediate post-surgery care period and medical discharge, she received multidisciplinary therapy, initially consisting of *Platelet Rich Plasma* for bone reconstruction, electroacupuncture and scheduled rehabilitation therapy using physical elements, plyometric, isotonic and isometric exercises, devices such as ultrasound, laser and tens.

On presentation

At the time of her initial appointment and examination at a Chiropractic clinic she was using a walker to facilitate mobility. She was also presenting with low back pain and left lower iliac postural abnormalities as well as left sacroiliitis. Increased lumbar lordosis and difficulty in lumbosacral flexo-extension was noted, as well as indications of knee osteoarthritis due to prostration and prolonged immobilisation and ankle deformity derived from the beginning of ambulation and the support that causes intra- and extra-articular oedema. Additional findings included nullified dorsi and plantar flexion, *adductor* weakness and *Iliotibial Band syndrome* and Post-traumatic neck pain with rectification by the use of a bracing collar for four weeks. The images are appended.

While her primary reason for presentation was to assist in and support recovery from the accident and resultant surgeries and to reduce the risk of losing the affected leg, primary clinical findings pertinent to this presentation included left pelvic deficiency, with a lower left sacrum and a short leg difference of 2.3 centimetres due to the traumatic bone loss. Other clinical findings included right-convex lumbar scoliosis, left posterior and inferior thoracic rotation, weakness and soft spots in *gastrocnemius*, *adductors* and *tibialis* muscles. Secondary concerns pertained to difficulties in leg extension, persistent oedema in the lower limb, compensatory hyperlordosis, back pain with scoliosis, and neck pain due to torticollis.

Lower limb radiometry confirmed the tibial difference in length. Radiographic markings in AP and lateral lumbosacral region showed a lower left iliac sway of 18mm, a Ferguson angle of 42°, cervical curve angle of 48°, dorsal scoliosis T1 to T11 of right convexity with 12° according to the Cobb method. Muscular strength tests revealed +1 in extensors of the foot, *genu valgum* of -4 at the right knee and -7° in the Q angle on the left.

Subluxations were identified at the anterior left lower sacrum, the posterior left iliacus in external rotation, lower left pubis and in the throughout the lumbar spine with right posterior body and left spinous. Additionally, cervical subluxations were found at posterior C3, atlas, and occiput, the lower left femoral head was internally rotated.

Aims of care

Aims of care were broken into stages given the severe nature of her injuries. In the first stage, aims of care included conservative management of pain due to injury, facilitation of general mobility after

four-weeks in hospital and five weeks of at-home rest, reduction of stress due to load on the sacrum and pelvis, and muscle facilitation in the lower limbs.

In the second stage which lasted one year, the aims of care were to improve and promote mobility, gait and load in the pelvis, sacrum and lower limbs, reduce compensatory ambulation and facilitate ergonomic postures for simple exercises, transfers, and activities of daily living.

By the third stage, the aims of care were maintenance and monitoring which lasted a year and a half. This included correction of segmental limitations of movement, empowering for load, power and resistance in lower limbs, as well as the correction of postural alterations due to the use of crutches and a cane.

Chiropractic care was thus focused on correcting segmental, pelvic, and sacral subluxations after trauma and surgery. Considerable work was put into recovering the axis of gravity both in a seated position and in a standing position to facilitate walking.

Multidisciplinary care for this patient included recommendations for recovery of strength and muscle tone in the areas affected by loss of bone and muscle mass. She received *platelet rich plasma* from her Primary Care Physician to support her recovery and to aid in the facilitation and adaptation of new tissue and recovery in grafting and surgeries. Physical therapy was also deployed in relation to mobilisation, walking, recovery of balance, and muscle strength.

Chiropractic management

Chiropractic care was initiated with conservative measures in the choice of adjustments, taking into account adaptations for the application of techniques according to the clinical moment and the patient's tolerance. Care was taken to find the most comfortable position and to decide on the type of adjustment or thrust to apply.

Adjustments began with low force interventions, initially consisting of advanced Activator™ adjustments, before commencement onto gentle adjustments with the Thompson and upper cervical techniques. In the later stages, she was able to tolerate HVLA adjustments using Gonstead and Diversified techniques. She currently performs light load physical activity, cycling, crossfit three times a week, with prior check-up and adjustment once a week and does supervised rehabilitation, recovering walking ability, muscle strength and balance.

Postural analysis was performed at each examination, using photographs and a grid implemented by applications. Radiographic measurements were deployed according to common methods, mainly based on Gonstead and Yochum. Motion Palpation™ was also utilised at each examination. Following the detection procedures through biomechanical references and specific chiropractic assessment tests, mobility limitations, fixed and painful areas in functional units were documented.

Orthopaedic tests provided important clinical information. The application of specific tests were based on signs of joint mobility, neurological and muscular provocation, we recognised affected areas related to the primary injury. The anatomical shortening causes the physiological adaptation of the pelvis and spine provocation test.

Through the analysis of AMCT provocation tests aided in the detection of vertebral subluxation, associated with the neurological mechanisms of adaptation and response of each segment. It was decided in the first stage to use them as a resource since it is a non-force conservative technique. Whenever a structural limitation was found, the neural induction or activation points were used from the pelvis, sacrum and L5 upwards, in confrontation with the short leg (left iliac -18mm), which shortened or lengthened more in the extended position. To recognise the side to place the activator the relative flexion of the knees was measured from -18mm.

Specific technique tests were also regularly deployed. Once the patient's recovery entered the mobilisation stage, being sure of the consolidation of the pelvis as well as the tibia and fibula through x-ray, the Thompson technique was used to evaluate the pelvis, sacrum, and lumbar mainly was paramount. The position of the patient and the composition of the trust and indicative vector were considered.

For the last stage, it was understood this period of time was about functional rehabilitation and physical abilities, so the adjustment began to focus on the principle of mobility and joint freedom, allowing techniques with a more studied vector and a specific and deep impulse. Thus, Gonstead was used as an analysis and adjustment technique mainly in sacrum, L4 and cervical spine. The Diversified technique was also used in segmental movement alterations such as thoracic, cervical from C3 to C7.

Physical Therapy and rehabilitation was facilitated through the use of specific devices and methods for the rehabilitation and mobilisation of the extremities, monitoring the improvement and functioning of the gait, as well as the application of physical means such as heat, hydrotherapy and electroacupuncture by trained personnel.

The patient's care plan was organised as follows:

Stage One: Symptomatic initial care.

While the sequelae of surgery, oedema, and stiffness due to immobilisation, lymphatic drainage and other sequelae were treated, chiropractic care and technique was based on minimal contact, mainly in the lumbar pelvis and sacrum. Advanced Activator™ technique was used, considering the stress tests, segmental induction and the test in favour of the correction as determinants of the side to be adjusted. Leg length was considered as initial 1.8 left with respect to the opposite, and when presenting changes, shortening, or lengthening, positive or negative without knee flexion initially. This stage lasted approximately 9 months with regular adjustments every week, for which a scheme of 26 to 30 adjustments was completed during that period until there was better knee flexion with the constant shortening of the left limb.

Stage Two: Recovering Mobility.

When recovering mobility of the pelvis, specifically of the sacroiliac joint as in both knees, it was determined that the possibility of using the *Derefield Flexion Position Test* as a reference was best to establish a baseline (supported by radiographic analysis). Other tests included gravity, Ferguson angle, iliacus measurement and pubic position as positive were indicators to use the drop-assisted Thompson Technique. With a frequency of one adjustment per week at the beginning of this care plan, biomechanical advances were recognised when adjusting before the mobilisation sessions and supervised activities with apparatus in the rehabilitation area.

Approximately 45 adjustments were completed during a period of 18 months where the main techniques were Thompson for pelvis, sacrum, and pubis, as well as femoral rotation correction. In the last stage, which has been from 2021 to date, gait and standing support have been recovered through a strength re-adaptation approach, supported by exercises in the rehabilitation area and the crossfit gym with advice from trained personnel. The patient is currently able to achieve one rep of 185lbs (84kg) on the power clean (deadlift), her squat no-load rep max is 25 in 3 minutes, and the deadlift is 220lbs (100kg). Chiropractic adjustments are performed once a week at the end of the week, and after the day of intense exercise, mainly with Gonstead and Diversified in Pelvis, sacrum and lumbar regions.

Reviews

As the initial injury was severe and required a multidisciplinary team, the appointments were organised in such a way that a constant schedule adapted to each clinical stage could be met. In addition, the insurance requirements and the legal instances that followed the case, required detailed reports of the patient's evolution and the risk of losing the limb, the acceptance of the bone autograft and the subsequent removal of orthotic elements such as intramedullary nails and screws.

The patient used a walker in the first stage, crutches in the second and a support cane in the second before progressing to unaided in the third stage.

Outcomes

Currently the change from 23mm to 16mm in leg length is significant. This is consistent with a current pelvic slope of 16mm length, and confirmed in lower limb measurements and radiometry. The patient now has a Q angle of 3° on the right knee and 5° on the left. Tibiofibular length is considered normal. Left pelvic deficiency is now only minor when compared to initial care, having moved from 18mm to 11mm.

The patient reports having recovered the functional capacity, strength, and sensitivity of the left leg, as well as the functions ADL. The use of a cane is less and only on special occasions and the use of a bicycle is almost his preferred method of transportation. The posture and gait of the patient is now very comfortable. She has regained a dynamic life and continuously talks about the chiropractic and multidisciplinary experience.

Discussion

Important aspects of this case begin with the patient not losing the limb. Given the severity of her injuries this was a possibility. While the multidisciplinary approach means that benefit was not achieved through Chiropractic care alone, it is a case report in which cooperation of multiple care modalities benefited the person under care.

A significant outcome is the regaining of a QoL that enabled the patient to participate fully in exercise, recreation, and other activities she deemed meaningful. This was likely thanks to the surgeries and the decision to exercise and attend chiropractic consultations regularly. It is an example of dedication and effort on the part of this professional, multidisciplinary community.

Her case has encouraged her surgeons to work in a multidisciplinary manner, recognising the contributions that other areas of care give to this type of post-traumatic case, in which any lack of organised follow-up and or inhibited financial resources reduces the likelihood of recovery and encourages abandonment of health goals. In this case, such abandonment may have resulted in significant ramifications such as increased pain, decreased mobility, and inability to participate in the activities of daily life.

Conclusion

Of course we cannot predict what may have happened should Chiropractic care not have been included in the care plan. However, this case report offers rationale for multidisciplinary care with organised follow-ups, objective measurements, and strict observation of any deficiency or unevenness of the pelvis, or alterations in gait alterations.

We have also indicated that these may potentially be recovered and corrected through chiropractic follow-up in addition to interdisciplinary care. Limitations apply in that generalisations cannot be made without larger studies. Hence, further research is required.

Clare McIvor
BBus(Admin),
GD Comms(ProfWrit>Edit),
GD(Psych)(Cand)
Writer, ASRF

Ruth Postlethwaite
BBiomedSc
Writer, ASRF

César Iván Real-Jiménez
Licenciatura en Quiropráctica / Maestría en
Ciencias del Deporte y el Ejercicio.
UNEVE México
Private practice of chiropractic
Nezahualcoyotl 200, Ajusco
Mexico City
quirop Practico.real@gmail.com

Cite: Real-Jiménez CI, Postlethwaite R, McIvor C. Chiropractic and multidisciplinary management of a traumatic injury in a 38 year old female: A case report. *Asia-Pac Chiropr J.* 2023;3:4. URL apcj.net/Papers-Issue-3-4/#CesarTraumaticInjury.

About the chiropractor

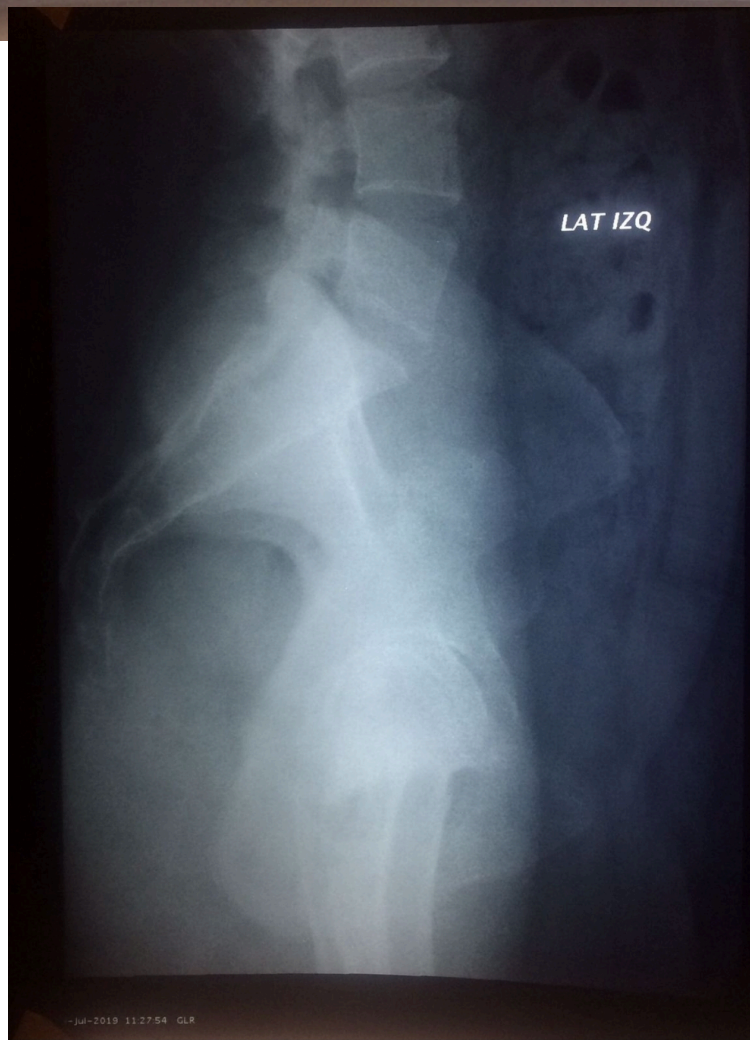
César Iván Real-Jiménez has a Master in Sport and Exercise Sciences, and studied chiropractic before moving into teaching and research. Her passion is for community practice and sports chiropractic, where she focuses on taking healthy human performance to the highest level. She offers mentoring and support to the chiropractic community through supporting the chiropractic identity, academic reinforcement, advanced techniques as well as development and research in degree projects for university students.

Images









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